Investigating
Cancer Cluster Concerns

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Overview

o Cancer in Texas

o Cancer Cluster Background

o Protocol and Methods of Investigation

o Difficulties in Investigating Suspected Cancer Clusters

o DSHS Response and Examples

o How to Learn More or Make a Request

What is "Cancer?"

- Cancer is a large group of diseases characterized by uncontrolled growth of abnormal cells.

- These abnormal (cancer) cells can spread to nearby tissue, as well as to other parts of the body through the bloodstream and lymphatic system.

- Benign tumors with the exception of certain childhood cancers are not considered cancerous because they do not invade nearby tissue or spread to other parts of the body.

Cancer in the U.S.

○ The American Cancer Society estimates that in 2014 over 1.6 million people will be diagnosed with cancer in the U.S., and 107,869 of those people will be Texans.

○ Cancer is the second leading cause of death in both Texas and the U.S..

- It is estimated that cancer will become the leading cause of death in the next decade.
- Cancer remains the leading cause of death from disease in children.

Cancer in Texas

- In 2012 there were 100,582 Texans newly diagnosed with cancer. 1,576 were in children and adolescents.

- There are over 500,000 Texans estimated as alive right now who have been diagnosed with cancer in the past 10 years.

- The Cancer Prevention and Research Institute of Texas estimated that in 2014, Texas cancer costs were $32.4 billion.

Definition of a "Cluster"
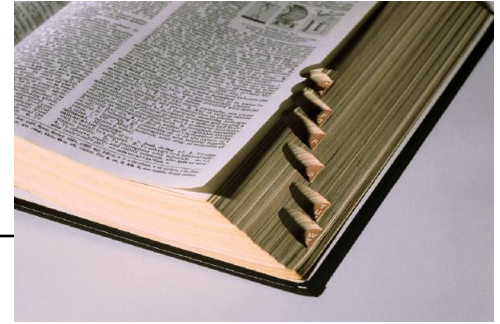
- **What Webster says:**
  "a number of persons, animals, or things gathered or situated close together"

- **What epidemiologists mean:**
  "a greater than expected number of cancer cases or deaths that occur in a group of people in a specific geographic area over a specific period of time"

- **What everyone else is usually thinking:**
  "There's way too much cancer in my neighborhood/school/town and what is the state going to do about it?"

Who Responds to Cluster Concerns at DSHS?
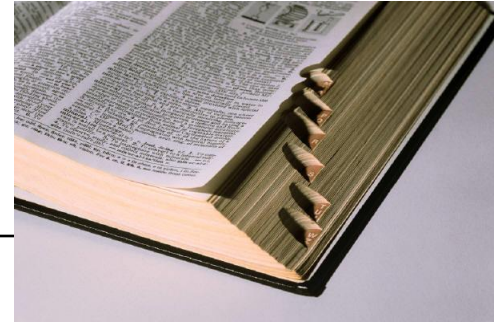
- Designated environmental epidemiologist in the Environmental & Injury Epidemiology & Toxicology Unit (EIET)

- Collaborates with Texas Cancer Registry (TCR) epidemiologists in the Cancer Epidemiology and Surveillance Branch

- Often works in collaboration with the Environmental Health Assessment and Consultation Program in the EIET

Most Common Texas Cancer Concerns

- "A large number of people on my block have cancer. Is there something wrong in my neighborhood?"
- Possible environmental exposures in the community (e.g., the air, water, soil)
- Occupational exposures
- Childhood cancers, particularly leukemias and brain tumors
- Common cancers (e.g., breast, lung, colorectal, prostate) are those most often perceived and reported by the public as being a part of a cancer cluster concern.

What Question Can a Cancer Cluster Investigation Answer?

- Whether or not an excess of cancer has been observed using the most current available Texas Cancer Registry data.

"Did we see more cases than expected?"

What Question Can a Cancer Cluster Investigation Answer?

- A cluster investigation may be useful for generating theories, helping determine whether or not additional study is needed, or providing support for a public health intervention.

- It is not designed to establish that exposure X causes Y cancer.

Why Cluster Investigations are Complicated

- Cancer is a term for many diseases with a variety of causes.

- Cancer is complex and caused by both external factors (e.g. tobacco) and internal factors (e.g. genetics).

- Cancer generally takes a long time to develop.

  - Ten or more years often pass between environmental exposures or the existence of other risk factors and detectable cancer.

Why Cluster Investigations are Complicated

- Inadequate control of confounding variables (e.g. liver cancer and hepatitis/cirrhosis)

- Cancer clusters can occur by chance and may not necessarily be due to any common cause.

- Small populations (low statistical power)

- Uncertain definitions of cluster boundaries and population of interest

- In and out migration

Recent Articles on Cancer Clusters

- "The challenges to understanding why cancers may cluster in time and space were first enumerated several decade ago, but still limit investigations today."
  - *Cancer Cluster Investigations: Review of the Past and Proposals for the Future. Goodman et al., In. J. Environ. Res. Public Health, Jan. 2014.*

- Of 428 investigations since 1990 reviewed from all 50 states, **13% (72)** had a confirmed increase in cancer. **Three** were linked to a hypothesized exposure. **Only one** investigation indicated a clear cause.
  - *Cancer Clusters in the USA: What do the Last Twenty Years of State and Federal Investigations Tell Us? Goodman et al., Critical Reviews in Toxicology, 2012.*

- There are hundreds of hazardous waste sites in the U.S.-but only three have been linked to excess cancers."
  - *Why Didn't Toxic Waste Cause a Cancer Epidemic, Like we Expected in the 1970's.* National Geographic News, Dec 2014.

So why do we do it?

- A concerned citizen doesn't care about esoteric epidemiology arguments.

- A prompt response is good public health practice.

- Can help ease concerns.

Four-Step Process for Evaluating Suspected Clusters

STEP 1. Initial Contact and Response
Purpose: Collect information from the person reporting the cancer cluster concern

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STEP 2. Assessment
Purpose: To determine a) whether the suspected cancer cluster is a statistically significant excess, and
b) Identify local environmental concerns and identify facts about those concerns

Stage 2a. Preliminary Evaluation
Purpose: To provide an estimate of the statistical likelihood that an excess has occurred

Stage 2b. Exposure Evaluation
Purpose: To identify any environmental contaminant(s) that could be related to the cases
(biologically plausible environmental exposure(s), assessment of possible exposure pathways(s)

Meets Criteria

YES ⬇   **NO** ➔ Summary report distributed. May recommend additional follow-up as more data becomes available.

STEP 3. Determining Feasibility
Purpose: To gather more information to assess the feasibility of performing an epidemiologic study
to determine whether the cases are associated with some common etiologic factor

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STEP 4. Epidemiologic Study
Purpose: To perform an etiologic investigation of a potential
disease-exposure relationship (often seen as research)

Based on: "Investigating Suspected Cancer Clusters and Responding to Community Concerns: Guidelines from CDC and the Council of State and Territorial Epidemiologists", Centers for Disease Control and Prevention, MMWR, September 27, 2013/ 62 (RR08): 1-14.

How Else Does DSHS Try and Address Cancer Cluster Concerns?

- Participate in national meetings and surveys regarding cancer cluster investigations

- Maintain regular reviews of the scientific literature

- Provide data to other federal, state, and local government officials and researchers

- Provide data to researchers for occupational and other studies

Examples of Federal, State, and Local Partners

- Centers for Disease Control and Prevention
    - Agency for Toxic Substances and Disease Registry (ATSDR)
    - National Center for Environmental Health
    - National Institute for Occupational Safety and Health
- Environmental Protection Agency
- Texas Commission for Environmental Quality
- Texas Railroad Commission
- Local health departments

DSHS Response to Cancer Cluster Concerns

- From 1986-2014, 987 cancer cluster investigations were completed.

- Examples of past high profile Texas investigations and the areas of concern:
  - Multiple zip codes near Kelly Air Force Base (trichloroethylene, vinyl chloride and excess of liver cancers),
  - Houston Ship Channel area (benzene, butadiene air levels and excess childhood leukemia/lymphoma),
  - El Campo area (trichloroethylene contamination in local groundwater, and excess kidney and renal pelvis cancers).

DSHS Response to Cancer Cluster Concerns

- Current examples of high profile Texas investigations and the areas of concern:
  - Flower Mound (hydraulic fracturing and elevated breast cancers)
  - Area in Southeast Harris County (San Jacinto Waste Pits Superfund site and various cancers)
  - Camp Lejeune, Jacksonville, NC (designated a Superfund site in 1989 and male breast cancer, in collaboration with ATSDR-CDC).

Examples of Exposure Related Cancer Studies Using Texas Cancer Registry Data

- University of Texas School of Public Health: Air pollution in the Houston Ship Channel and childhood leukemia

- NIOSH/CDC Cancer Incidence Study on Workers Exposed to Ethylene Oxide

- SWTSU, Texas A&M: GIS Analyses of Hazardous Waste Sites and Texas Cancer Incidence Data

- TX A&M School of Rural Public Health: Agricultural Pesticides and Childhood Cancers

- Texas Tech University: Cancer Incidence and Exposure to Low-Level Arsenic in Drinking Water

- UT Health Science Center, ATSDR: Kelly Air Force Base

For more information on cancer clusters, please contact:

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